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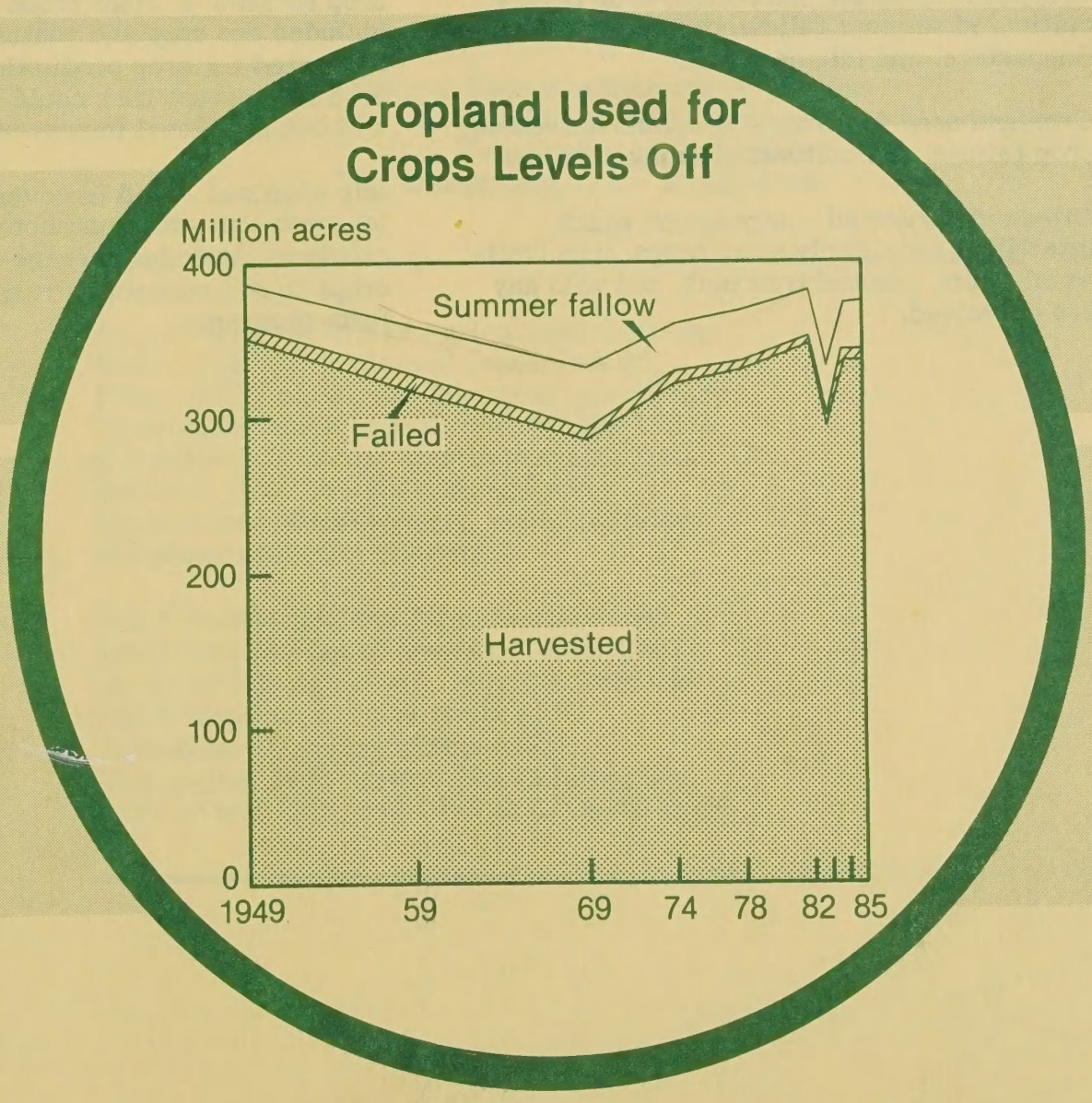
Cropland Use and Supply

Outlook and Situation Report



INTRODUCTION

Total acreage in the cropland base has been relatively stable over recent decades. However, uses within the base vary with cost–price relationships and cropland diversion programs. Several programs for price and income supports, cropland diversion, export marketing, and resource conservation have been proposed for the 1985 farm bill. If enacted, these programs could bring about additional adjustments in cropland use.

Current trends and near–term outlook for cropland used for crops--the land in crop production--are examined in this report. Uses of other cropland and the potential for converting other land to cropland are also examined. The following terms are used:

Cropland - cropland harvested, crop failure, cultivated summer fallow, cropland used only for pasture, and idle cropland.

Cropland used for crops – cropland harvested, crop failure, and cultivated summer fallow.

Cropland harvested – acreage on which intertilled and closely sown crops, tree fruits, small fruits, planted tree nuts, and wild hay are harvested.

Crop failure – mainly acreage on which crops failed because of weather, insects, and diseases, but includes some land not harvested due to lack of labor, low market prices, or other factors. Excludes acreage planted to cover and soil improvement crops not intended for harvest.

Cultivated summer fallow – cropland in subhumid regions of the West cultivated for a season or more to control weeds and accumulate moisture before small grains are planted. Other types of fallow, such as cropland planted to soil improvement crops but not harvested and cropland left idle all year, are excluded.

Cropland used only for pasture – land currently in pasture as part of a long–term crop rotation of field crops and pasture. Also included are cropland pastured rather than harvested for crop production and some land used for pasture that could have been cropped without additional improvement.

Idle cropland – land in cover and soil improvement crops and completely idle cropland. Includes acreage diverted from crops to soil conserving uses under Federal farm programs.

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The *Cropland Use and Supply Outlook and Situation* is published annually. Additional copies of this report are available from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, D.C. 20402. For ordering and price information, call GPO at (202) 783–3238.

SUMMARY

Cropland used for crops--cropland harvested, cropland on which crops failed, and cultivated summer fallow--is expected to total 374 million acres in 1985. This is essentially unchanged from the 373 million in 1984, but 41 million above the 1983 level when about 78 million acres were idled under the payment-in-kind and other production adjustment programs. About 34 million acres were diverted from production this year. Cropland used for crops peaked at 387 million acres in 1981, when there were no production adjustment programs.

Cropland used for crops in 1986 will be affected by legislative actions. Most proposed bills include features for tying price and income support programs more closely to market conditions, expanding export marketing programs, and linking participation in soil and water conservation programs to eligibility for receiving benefits from price and income support programs. If a 1985 bill is not enacted or if the 1981 Act is not extended, several commodity support and other farm programs will revert to enabling legislation, some of which was passed in the 1930's and 1940's. In this legislation, commodity price supports were set at a minimum of 50 percent of parity for crops and 75 percent for dairy. Supply control provisions were minimal or nonexistent.

Several proposals for the 1985 bill would allow farmers to enter into 7- to 15-year contracts to put some erosion-prone cropland in a conservation reserve. USDA's Soil Conservation Service (SCS) identified nearly 50 million acres of highly erodible cropland in 1982. About one-fourth of this acreage was in the Plains regions and another one-fourth was in the Corn Belt.

Regional adjustments in cropland used for crops over the past three decades have resulted in a higher concentration of acreage in the Corn Belt, Lake States, and Northern Plains, which together accounted for nearly 60 percent of all acreage in 1984. These regions had a combined increase of 11 million acres during 1949-81, while regions to the east and south--except the Delta States with a 3-million-acre increase--lost 16 million acres. The Mountain and Pacific regions also had a combined gain of nearly 5 million acres. The increases resulted from improved drainage, clearing of forest land, and conversion of pasture to crop production. Cropland used for crops in the United States totaled 387 million acres in 1949, the same as in 1981.

Cropland has been used more intensively, particularly during 1972-82, when production adjustment programs were cut back or discontinued and cost-price relationships improved in the mid- and late 1970's. Cropland used for crops advanced from 70 percent of all cropland in 1969 to nearly 82 percent in 1982. Irrigated acreage increased by 25 percent during 1969-82, while acreage double cropped nearly quadrupled.

In addition to acreage currently cropped, SCS identified a sizable amount of pasture and forest land in 1982 that had relatively high physical potential for conversion to cropland. Sufficient cropland is currently or potentially available for producing commodities to meet domestic requirements and historical export volumes into the foreseeable future.

1985-86 OUTLOOK

Cropland used for crops--cropland harvested, cropland on which crops failed, and cultivated summer fallow--is expected to total 374 million acres in 1985. This is essentially unchanged from the 373 million acres in 1984, but 41 million above the 1983 level when acreage was reduced with the payment-in-kind (PIK) and other cropland diversion programs. About 34 million acres of cropland will be diverted from production in 1985, compared with 27 million in 1984 and 78 million in 1983. The anticipated 374 million acres of cropland used for crops this year are 13 million below the peak of 387 million acres in 1981, when no cropland was diverted due to farm programs.

An estimated 337 million acres of cropland will be harvested in 1985--unchanged from 1984. This, together with probably 6 million acres of failed crops, and about 31 million acres of cultivated summer fallow, account for the 374 million acres of cropland used for crops this year.

Numerous factors will affect acreage use in 1986. Several versions of the 1985 farm bill have been proposed in Congress. Some features are common to several of the bills. They include 1) a shift to more market-oriented price and income support programs, 2) more aggressive export marketing and liberalization of trade practices, and 3) more comprehensive soil and water conservation programs that are tied directly to commodity support programs. Farmer participation in programs that call for the removal of erosion-prone cropland from production and its transferral to a conservation reserve would directly affect cropland acreage in 1986 and later years.

Harvested acres needed to meet export demand have dropped sharply in 1985 as exports of U.S. agricultural products fell to their lowest level since 1977. Fiscal 1985 exports will be 10-12 percent below last year's 143.6 million metric tons and more than 20 percent below the 1979/80 peak. Record foreign supplies of many commodities, U.S. support rates above world prices, a strong dollar, continued credit and debt restraints in some large traditional importing countries, and several other factors have all contributed to the loss of export markets. Many of these same factors will affect U.S. agricultural exports in fiscal 1986, and preliminary estimates of world commodity and economic conditions point to another decline. Largest declines are expected in feed grains and cotton. Soybeans are about the only commodity with improved export prospects, but exports will be well below levels attained prior to fiscal 1985. With 1985 crops expected to post record or near-record yields, there will be further expansion in reserves of major crops.

CROPLAND USED FOR CROPS

Acreage peaked at 387 million in 1949 and remained around 380 million until 1956 when cropland diversion programs began (table 1). Acreage dropped to 369 million in 1956 and then, as diversion programs continued, trended downward during the 1960's to 334 million in 1972 (11).1/ Easing of diversion programs in 1973, plus favorable returns to producers through expanding export markets, caused growers to shift idle cropland and cropland pasture into crop production. Acreage then increased to 387 million in 1981--identical to the 1949 peak.

Acreage of principal crops planted in 1985 is estimated at 344 million, down about 1 million from 1984 (15). If recent harvest rates continue and harvested acreage of minor crops is about 12 million, as in preceding years,

1/ Numbers in parentheses cite references at the end of this report.

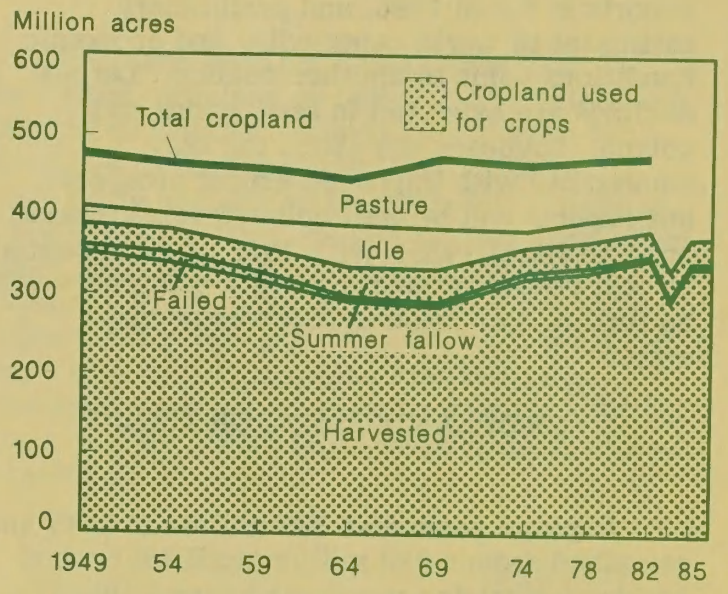
Table 1--Major uses of cropland, United States

Cropland	1949	1959	1969	1978	1982	1983	1984	1985 1/
	Million acres							
Cropland used for crops	387	359	333	369	383	333	373	374
Cropland harvested	352	317	286	330	347	294	337	337
Crop failure	9	11	6	7	5	5	6	6
Cultivated summer fallow	26	31	41	32	31	34	30	31
Idle cropland	22	33	51	26	21	(2)	(2)	(2)
Cropland pasture	69	66	88	76	65	(2)	(2)	(2)
Total cropland3/	478	458	472	471	469	(2)	(2)	(2)

1/ Preliminary. 2/ Estimated only for years coinciding with a Census of Agriculture. 3/ Includes the 48 conterminous States.

Source: (2,3,4,11,18,19).

Figure 1
Major Uses of U.S. Cropland



about 347 million acres are expected to be harvested. Of these, close to 10 million likely will be double cropped. So, cropland harvested in 1985 is estimated at 337 million acres, the same as in 1984. However, the 1985 acreage is 43 million above the 1983 level.

Acreage of cropland harvested declined rather steadily from a near peak of 352 million in 1949--peak acreage was 353 million in 1944--to 289 million acres in 1972 (11). An average of 23 million acres of cropland was diverted annually in the late 1950's, increasing to an average of over 50 million during 1960-72. Acreage harvested increased in the mid- and late 1970's, reaching 351 million acres in 1981, before declining to current levels.

About 30 million acres of cropland are usually summer fallowed. However, summer fallow increased 7-10 million acres in the 1960's when large acreages of cropland were diverted from production. Acreage also increased 3-4 million in 1983.

Crop failure averaged 6-7 million acres annually over the past 20 years. Failure is expected on about 6 million acres in 1985. Crop failure averages about 2 percent of the cropland harvested.

Regional Use in 1984

Nearly 93 million acres of cropland used for crops were in the Northern Plains, one-fourth of the U.S. total in 1984 (table 2). (Regional acreages are not yet available for 1985.) The second largest acreage--85 million and 23 percent of the total--was in the Corn Belt. The Lake States, Southern Plains, and Mountain regions each had about 10 percent of the total. Other regions had 4-6 percent.

Summer fallowing is principally confined to wheat-producing areas of the Plains and western regions. The practice is especially widespread in the Mountain region, where 10.5 million acres--27 percent of the region's cropland used for crops--was fallowed in 1984. About 15 million acres were fallowed in the Northern Plains, 16 percent of the region's cropland used for crops.

Crop failure was highest in the Plains regions, which accounted for over half of all failures in 1984. The 2.1 million acres of failure in the Southern Plains represented 6.4 percent of that region's cropland used for

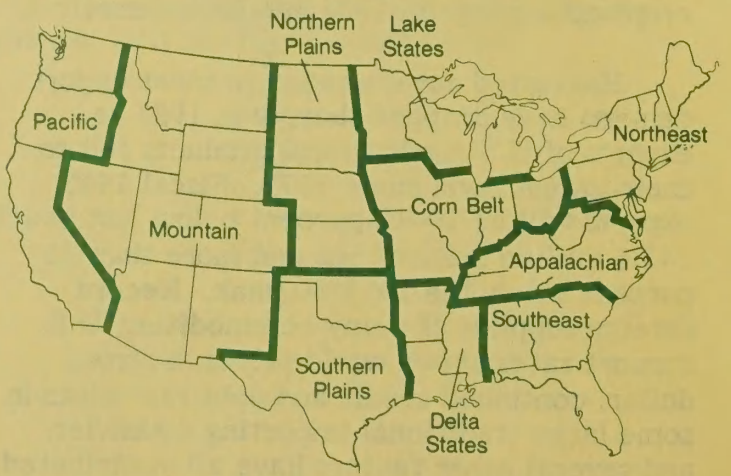
Table 2.--Cropland used for crops by region, 1984

Region	Cropland harvested	Crop failure	Cultivated summer fallow	Cropland used for crops	Share of U.S. cropland used for crops	Share of U.S. total land area
	Million acres				Percent	
Northeast	13.2	0.1	--	13.3	3.5	5.9
Lake States	38.9	0.4	--	39.3	10.5	6.4
Corn Belt	84.2	0.7	--	84.9	22.7	8.7
Northern Plains	76.3	1.3	15.0	92.6	24.8	10.2
Appalachian	18.4	0.2	--	18.6	5.0	6.5
Southeast	14.2	0.2	--	14.4	3.9	6.5
Delta States	18.0	0.3	--	18.3	4.9	4.9
Southern Plains	29.0	2.1	1.6	32.7	8.8	11.2
Mountain	27.0	1.0	10.5	38.5	10.3	28.9
Pacific	17.5	0.1	3.2	20.8	5.6	10.8
United States1/	336.7	6.4	30.3	373.4	100.0	100.0

1/ Includes the 48 conterminous States. Cropland used for crops in Alaska and Hawaii totaled less than 200,000 acres.

Source: (4,11).

Figure 2
Farm Production Regions



crops, compared with 1.4 percent in the Northern Plains, 2.6 percent in the Mountain region, and only 0.8 percent in the Corn Belt.

The regional concentration of cropland is more apparent when percentage distributions of cropland used for crops are compared to distributions of total land area. Together, the Corn Belt and Northern Plains regions had nearly 48 percent of all crop acreage but only 19 percent of the total land area (table 2). Except for the Lake States and Delta States regions, percentage shares of crop acreage in all other regions were less than respective shares of land area. This relationship was most evident in the Mountain region, where nearly 30 percent of all land but only 10 percent of the crop acreage was located.

Acreage Rebounds in Northern Regions after PIK

Acreage of cropland used for crops decreased nearly 54 million from its peak in 1981 to the reduced levels of 1983 due to PIK and other acreage reduction programs (table 3). From 1983 to 1984, cropland used for crops increased 40 million acres, but this represented only 75 percent of the 1981–83 decline, as nearly 27 million acres were still diverted from production.

Acreage increased in all regions in 1984. However, the proportion of the increase in most regions differed from their shares of the 1981–83 decline. The Southeast was the exception with 3 percent of both the decline

Table 3.--Cropland used for crops and change in acreage by region

Region	1949	1972	1981	1983	1984	Change 1949-72	Change 1972-81	Change 1981-83	Change 1983-84
				Million acres					
Northeast	17.2	12.3	13.6	12.8	13.3	-4.9	1.3	-0.8	0.5
Lake States	38.2	32.3	40.3	33.8	39.3	-5.9	8.0	-6.5	5.5
Corn Belt	78.0	72.8	87.5	71.4	84.9	-5.2	14.7	-16.1	13.5
Northern Plains	93.9	87.2	93.5	84.0	92.6	-6.7	6.3	-9.5	8.6
Appalachian	22.3	15.6	19.4	16.6	18.6	-6.7	3.8	-2.8	2.0
Southeast	20.2	12.1	14.8	13.2	14.4	-8.1	2.7	-1.6	1.2
Delta States	16.6	16.4	19.6	16.2	18.3	-0.2	3.2	-3.4	2.1
Southern Plains	44.7	29.8	38.0	28.7	32.7	-14.9	8.2	-9.3	4.0
Mountain	34.7	35.0	38.1	36.3	38.5	0.3	3.1	-1.8	2.2
Pacific	20.8	20.0	22.2	20.1	20.8	-0.8	2.2	-2.1	0.7
United States1/	386.6	333.5	387.0	333.1	373.4	-53.1	53.5	-53.9	40.3
Percent share of U.S. total:				Percent					
Northeast	4.4	3.7	3.5	3.8	3.6	9.1	2.4	1.5	1.2
Lake States	9.9	9.7	10.4	10.1	10.5	11.0	15.0	12.1	13.6
Corn Belt	20.2	21.8	22.6	21.4	22.7	9.7	27.5	29.9	33.5
Northern Plains	24.3	26.1	24.2	25.2	24.8	12.5	11.8	17.6	21.3
Appalachian	5.8	4.7	5.0	5.0	5.0	12.5	7.1	5.2	5.0
Southeast	5.2	3.6	3.8	4.0	3.9	15.1	5.0	3.0	3.0
Delta States	4.3	4.9	5.1	4.9	4.9	0.4	6.0	6.3	5.2
Southern Plains	11.6	8.9	9.8	8.6	8.8	27.7	15.3	17.3	9.9
Mountain	9.0	10.5	9.8	10.9	10.3	0.6	5.8	3.3	5.5
Pacific	5.4	6.0	5.7	6.0	5.6	1.5	4.1	3.9	1.7
United States1/	100.0	100.0	100.0	100.0	100.0	2/ 100.0	100.0	100.0	100.0

1/ Includes the 48 conterminous States. Cropland used for crops in Alaska and Hawaii totaled less than 200,000 acres in 1982. Because of rounding, regional data may not sum to U.S. totals. 2/ Percentage distribution of absolute values.

Source: (11).

and partial recovery. The disparity was most evident in the northern regions--Northern Plains, Lake States, and Corn Belt--which accounted for 60 percent of the decline but 68 percent of the recovery. Similarly, the Mountain region had 3 percent of the decline, but 5.5 percent of the increase.

In other regions--Northeast, Appalachian, Southeast, Delta States, Southern Plains, and the Pacific--shares of the increase were lower than their shares of the decline. These regions had 37 percent of the decrease but only 26 percent of the increase. The difference was most significant in the Southern Plains, which had 17 percent of the decrease but only 10 percent of the recovery.

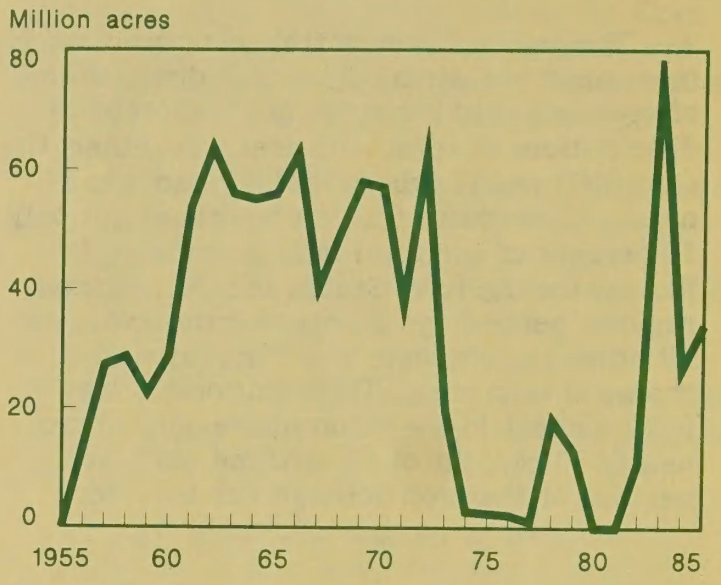
*Acreage Shift to Northern Regions During 1949-81*2/*

Cropland used for crops totaled 387 million acres in 1949, the same as in 1981. During this interval, however, total acreage was redistributed among regions. The Corn Belt, Lake States, and Northern Plains gained 11 million acres while regions to the east and south lost 16 million. Only the Delta States had an increase--3 million acres--while acreage declined in the Northeast, Appalachian, Southeast, and Southern Plains (table 3). The Mountain and Pacific regions had a combined increase of nearly 5 million acres.

Acreage decreased rather steadily during 1949-72. Acreage diversion programs began in 1956 with the Soil Bank when 14 million acres were placed in conservation reserves (CR) under contract for 3-10 years (19). By 1961, 29 million acres were under CR contracts, of which about 3 million had been planted to trees with the rest in soil improvement crops not to be harvested or pastured. In addition, 25 million acres of corn and sorghum were diverted under the 1961 annual program. In 1972, 62 million acres were diverted, of which only 3 million were in long-term programs (fig. 3). Soil Bank contracts had expired by this time, but the Cropland Adjustment Program (CAP) for long-term diversion was initiated. Cropland diverted earlier was returned to production, used as cropland

2/ Land-use changes are discussed in more detail in a later section, "Dynamics of Cropland Use."

Figure 3
U.S. Cropland in Diverted Acres



pasture, or idled through abandonment. Some also was converted to urban and other nonagricultural uses.

Largest decreases during 1949-72 occurred in the Southern Plains--15 million acres--and the Southeast--8 million acres--which together accounted for nearly 45 percent of the total reduction. The Northern Plains and each region to the east had reductions of 5-7 million acres. Acreage was down by less than 1 million in both the Pacific and Delta States regions.

Producers increased acreage by 53.5 million during 1972-81. Recovery was uneven among regions. The Corn Belt, Lake States, and Northern Plains accounted for nearly 55 percent of the 1972-81 increase but only 33 percent of the 1949-72 decrease (table 3). Recovery was most dramatic in the Corn Belt, a 14.7-million-acre increase. The Northeast, Appalachian, and Southeast regions had 14.5 percent of the increase--7.8 million acres--far less than their 37-percent share of the 1949-72 decrease. The 8.2-million-acre increase in the Southern Plains was only 55 percent of the region's 14.9-million decrease during 1949-72.

Acreage of Major Crops Increases

Harvested cropland increased 14.4 million acres during 1974-84 (table 4). Cropland pasture and permanent pasture were converted to crop production, and some forest land was

cleared. These conversions were offset somewhat as cropland diverted from production increased from 3 million acres of CAP in 1974 to 27 million of annual program reduction in 1984. (An acre of cropland diverted is generally associated with a 0.5- to 0.6-acre reduction in cropland harvested.) The 1974-84 period covers the early buildup of crop production in response to expanding export markets in the 1970's. Average prices received by producers were somewhat lower in 1984--$3.38 for wheat, $2.67 for corn, and $5.90 for soybeans--compared to $4.09, $3.02, and $6.64, respectively, in 1974. However, the wheat support price was $4.38 in 1984, compared with $2.05 in 1974, while the 1984 corn support price was $3.03 and $1.38 in 1974. Indices of prices paid steadily increased during this period (fig. 4 and 5).

Soybean harvested acreage in 1984--66.1 million--was nearly 30 percent above the 1974 level (table 5). Relatively minor increases were recorded for corn (2.8 million acres) and wheat (1.5 million acres) while cotton acreage was down 2 million, and sorghum acreage was essentially unchanged. Some of the changes resulted from farmers diverting 27 million acres of cropland from production in 1984, compared with only 3 million in 1974. Soybeans were not included in the diversion programs. The five crops accounted for nearly 85 percent of all cultivated crops in 1984.

Substantial increases in soybean acreage in the Corn Belt, Lake States, and Northern Plains regions contributed to their 60-percent share of the increase in all cropland harvested during 1974-84. Among these regions, double cropping soybeans with fall-seeded grains is only important in the Corn Belt.

Wheat production shifted from northern to southern regions. Although the nationwide increase was only 1.5 million acres, acreage in the Appalachian, Southeast, Delta States, and Southern Plains regions increased 4.4 million acres. In contrast, the Northern Plains had 2.1 million fewer acres while combined acreage in all other regions declined 800,000 acres.

Wheat prices have trended downward since 1980, but the target or income-support price has steadily increased since 1975, exceeding prices received during 1982-85. Soybean prices have varied without trend for the past 10 years. While cost-price relationships for the individual crops have deteriorated, lower unit production costs with double cropping and cash flows from fall-seeded grains provide economic incentives for double cropping where growing conditions are favorable. Double cropping soybeans and wheat is most prevalent in the Appalachian, Southeast, and Delta States regions. In the Southeast, acreage shifted from corn and cotton production to wheat and soybeans

Table 4.--Change in harvested acreage of major crops by region, 1974-84 and 1983-84 1/

Region	1974-84 change						1983-84 change					
	Corn	Sorghum	Wheat	Soybeans	Cotton	All cropland harvested	Corn	Sorghum	Wheat	Soybeans	Cotton	All cropland harvested
	Million acres											
Northeast	0.5	-	-0.2	0.3	-	0.4	0.5	-	-	0.1	-	0.5
Lake States	1.5	-	-0.2	2.2	-	2.8	3.9	-	0.5	0.9	-	5.6
Corn Belt	1.2	1.0	0.1	4.0	-0.1	3.4	10.1	0.8	0.4	1.4	0.1	13.3
No. Plains	-0.4	0.8	-2.1	3.6	-	2.5	3.1	2.3	2.8	1.2	-	10.7
Appalachian	0.6	0.3	0.7	1.4	-0.3	1.5	1.1	0.3	-	0.1	0.1	2.0
Southeast	-1.5	0.2	1.2	1.9	-0.7	1.0	0.6	0.1	-0.1	-	0.2	1.2
Delta States	-	1.0	1.9	1.2	-1.4	1.7	0.1	0.5	-	-	0.7	2.0
So. Plains	0.6	-3.2	0.6	0.1	0.1	-0.9	0.5	1.0	1.4	-	1.2	3.9
Mountain	0.1	-	0.1	-	-	1.8	0.1	0.3	0.4	-	0.2	1.9
Pacific	0.3	-0.1	-0.6	-	0.2	0.2	0.1	0.1	-	-	0.5	1.1
United States2/	2.8	-0.1	1.5	14.8	-2.1	14.4	20.1	5.2	5.5	3.6	3.1	42.1

1/ Corn and sorghum for grain, silage, and forage. 2/ Includes the 48 conterminous States. Because of rounding, regional acres may not sum to U.S. totals.

Source: (11,14,16).

during 1974–84. Cotton acreage in the Delta States shifted to wheat, soybeans, and sorghum. Sorghum is also grown as a second crop.

Harvested cropland decreased 53 million acres from 1982 to 1983 (11). Modification of PIK and other programs resulted in a 42.1–million–acre increase in cropland harvested in 1984 (table 4). Corn acreage was up by one–third--20 million acres. Wheat and sorghum acreages were both 5 million higher, and soybeans and cotton were up about 3 million acres each.

Regional increases in cropland harvested in 1984 were not proportional to decreases in 1983 (11). The Corn Belt and Northern Plains had 51 percent of the 1983 decline in harvested acreage, but 57 percent of the 1984 increase. The southern regions--Appalachian, Southeast, Delta States, and Southern Plains--had 28 percent of the reduction, but only 22 percent of the recovery. This imbalance was most evident in the Southern Plains, which had 15 percent of the decrease, but only 9 percent of the increase.

OTHER USES OF CROPLAND

Idle cropland and cropland pasture, along with cropland used for crops, comprise the cropland base. About 20 percent of all

Figure 4
U.S. Farm Prices for Wheat and Soybeans, Wheat Support Price, and Prices Paid

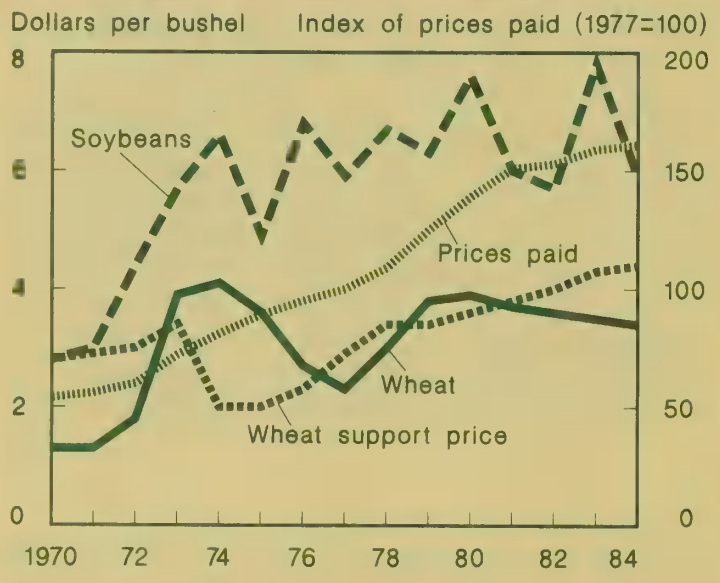


Figure 5
U.S. Farm Prices for Corn, Support Price, and Prices Paid

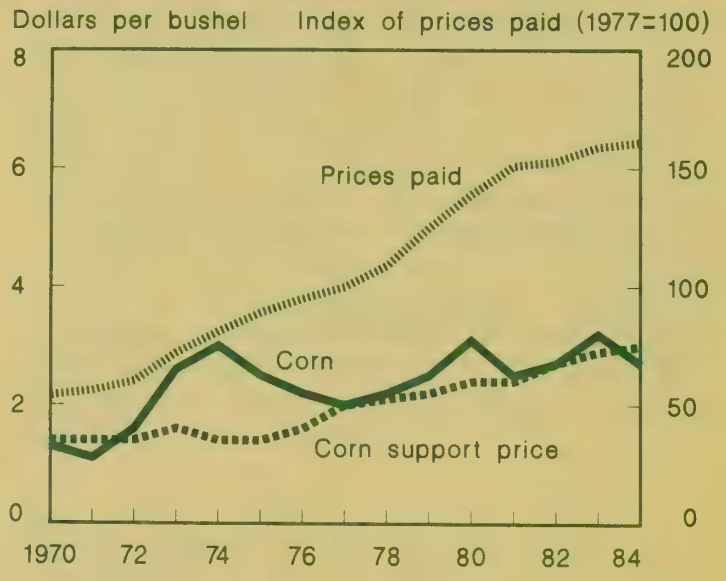


Table 5.--Harvested acreage of major crops by region1/

Region	Corn			Sorghum			Wheat			Soybeans			Cotton		
	1974	1983	1984	1974	1983	1984	1974	1983	1984	1974	1983	1984	1974	1983	1984
	Million acres														
Northeast	3.9	3.9	4.4	-	-	-	0.8	0.6	0.6	0.7	0.9	1.0	-	-	-
Lake States	12.8	10.4	14.3	-	-	-	3.7	3.0	3.5	4.7	6.0	6.9	-	-	-
Corn Belt	35.7	26.8	36.9	0.7	0.9	1.7	5.8	5.5	5.9	26.8	29.4	30.8	0.3	0.1	0.2
No. Plains	13.0	9.5	12.6	6.4	4.9	7.2	27.9	23.0	25.8	2.7	5.1	6.3	-	-	-
Appalachian	4.5	4.0	5.1	0.2	0.2	0.5	1.2	1.9	1.9	4.4	5.7	5.8	0.7	0.3	0.4
Southeast	3.7	1.6	2.2	0.2	0.3	0.4	0.4	1.7	1.6	3.3	5.2	5.2	1.3	0.4	0.6
Delta States	0.3	0.2	0.3	0.3	0.8	1.3	0.5	2.4	2.4	8.3	9.5	9.5	3.5	1.4	2.1
So. Plains	1.1	1.2	1.7	7.9	3.7	4.7	9.7	8.9	10.3	0.5	0.6	0.6	5.0	3.9	5.1
Mountain	1.3	1.3	1.4	0.8	0.5	0.8	10.2	9.9	10.3	-	-	-	0.6	0.4	0.6
Pacific	0.5	0.7	0.8	0.2	-	0.1	5.1	4.5	4.5	-	-	-	1.2	0.9	1.4
United States2/	76.9	59.6	79.7	16.7	11.4	16.6	65.4	61.4	66.9	51.3	62.5	66.1	12.5	7.3	10.4

1/ Corn and sorghum for grain, silage, and forage. 2/ Includes the 48 conterminous States. Because of rounding, regional acres may not sum to U.S. totals.

Source: (14,16).

cropland has been idled or pastured since 1949, except in 1969 when nearly 30 percent was in these uses (table 1). Much of this acreage is readily convertible to crop production. Since total cropland has not varied much since 1949, acreage idled and pastured varied inversely with acreage of cropland used for crops.

Cropland Pasture

Much of the 65 million acres of cropland used only for pasture in 1982--nearly 14 percent of all cropland--is routinely rotated between crop and pasture use, although the length of rotation period varies (Table 6). Part of this acreage is marginal for crop use and may remain in pasture indefinitely. Acreage peaked at 88 million in 1969 and then declined as acres for crop production increased. Livestock numbers also declined in several regions.

The buildup of cropland pasture in most regions during 1949-69 resulted from cropland being planted to soil-improvement crops with the Soil Bank and other diversion programs and then not returned to production. Acre

Table 6.--Acres in cropland pasture by region1/

Region	1949	1959	1969	1978	1982
	Million acres				
Northeast	4.2	3.2	3.7	3.1	2.5
Lake States	5.7	4.7	5.3	3.9	3.0
Corn Belt	14.9	12.8	16.9	14.0	10.9
Northern Plains	4.7	4.7	11.3	9.4	9.5
Appalachian	11.2	9.5	12.4	10.6	9.1
Southeast	4.3	4.3	5.6	5.3	4.3
Delta States	5.9	5.9	6.7	5.6	4.4
Southern Plains	9.0	10.8	16.8	16.3	13.9
Mountain	4.2	4.8	5.7	4.8	4.6
Pacific	5.2	4.7	3.8	3.1	2.8
United States2/	69.3	65.4	88.2	76.1	65.0
Percent of all cropland:			Percent		
Northeast	17.2	15.3	20.6	17.8	14.4
Lake States	12.3	10.2	11.9	8.6	6.7
Corn Belt	15.6	13.5	16.6	13.8	10.9
Northern Plains	4.6	4.6	10.5	9.2	8.9
Appalachian	30.0	31.7	39.3	34.1	29.9
Southeast	15.4	20.0	27.6	24.9	21.3
Delta States	24.2	28.5	27.2	21.5	17.7
Southern Plains	16.6	20.0	30.0	29.2	25.5
Mountain	10.6	11.3	13.2	11.0	10.5
Pacific	19.3	18.0	15.5	12.0	11.1
United States2/	14.5	14.3	18.7	16.2	13.9

1/ Estimated for years coinciding with a Census of Agriculture. 2/ Includes the 48 conterminous States.

Source: (2,3,4,18,19).

increases were especially large in the Plains regions, which jointly accounted for nearly one-third of all acreage in 1969. Cropland pasture represented only 10.5 percent of all cropland in the Northern Plains in 1969, but 30 percent of the cropland base in the Southern Plains. Acreage didn't increase much in the Appalachian, Southeast, and Delta States regions, but pasture was a major use of cropland--nearly 40 percent in the Appalachian and 27 percent in the other two regions. Acreage decreased in the Northeast and Pacific regions. Both regions experienced significant reductions in cropland bases and modest declines in livestock numbers.

Conversions of cropland pasture to crop production during 1969-82 were largest in the Corn Belt where cropland pasture was reduced by 6 million acres. A high proportion of this pasture is suitable for crop production at any time. The number of cattle and calves dropped 15 percent. Cropland pasture represented nearly 17 percent of all cropland in 1969 but only 11 percent in 1982.

Acreage also declined in the Plains regions, but to a lesser extent. Although the regions had nearly 5 million fewer acres of cropland pasture in 1982, they had a larger share of the total--32 percent in 1969 compared with 36 percent in 1982. Pasture in these regions would be somewhat less suitable for crop production than pasture in the Corn Belt. Also, livestock numbers in 1982 were slightly higher in the Northern Plains and unchanged in the Southern Plains.

Pasture remains an important use of cropland in the Appalachian region. Nearly 40 percent was in pasture in 1969, and 30 percent was still in pasture in 1982. This region has a relatively high incidence of small, scattered fields that are more difficult to bring back into production with modern machinery. Livestock numbers were also higher in 1982 than in 1969.

Idle Cropland

Idle cropland includes land completely idled and land seeded to soil improvement crops but not harvested or pastured. Some is idled each year because of adverse weather and soil conditions at planting time, lack of economic incentives, and personal reasons.

Other acreage is idled because of cropland diverted under Federal farm programs.

About 21 million acres were idled in 1982--4.5 percent of all cropland--when 11 million acres were diverted from production (table 7). This is considerably below the 58 million acres idled in 1969. Idled acreage was returned to production in all regions during 1969-82, but with different intensities. Acreage decreased 11 million in the Corn Belt, where a large proportion of the idled acreage--77 percent in 1967--was Class I-III land (12).3/ Idled cropland as a percent of all cropland in the Corn Belt decreased from 14 percent in 1969 to only 3 percent in 1982. Activation of idled cropland was less rapid in the Plains regions; 13 million acres were idled in 1969 and nearly 8 million in 1982. Based on 1967 data, 72 percent of idled cropland in the Plains regions was class I-III land.

In the absence of major cropland diversion programs and major changes in the cropland base, about 15-20 million acres of cropland are idled annually in the United States.

INTENSITY OF CROPLAND USE

Farmers have used cropland more intensively over time. Idle cropland and cropland pasture have been converted to crop production, particularly after 1972. Per acre use of fertilizer and agricultural chemicals has increased. More land has been irrigated. Double and multiple cropping, representing yet more intensive use of cropland, has substantially increased.4/

Cropland used for crops as a percent of total cropland is one indicator of intensity of use. At the national level, 81.6 percent of all cropland was used in crop production in 1982, up only slightly from 81.0 percent in 1949 (table 8). However, regional shifts occurred during this interval. Percentages were higher in 6 of 10 regions, especially the Northeast, Delta States, and Pacific regions.

3/ For a description of land capability classifications used by the Soil Conservation Service, see (8).

4/ See special article, "Trends in Double Cropping."

Table 7.--Acres in idle cropland by region1/

Region	1959	1969	1978	1982
	Million acres			
Northeast	2.6	2.0	1.2	0.9
Lake States	4.2	7.5	3.2	2.2
Corn Belt	3.5	14.4	4.4	3.0
Northern Plains	6.2	7.7	5.1	3.7
Appalachian	3.1	4.4	2.3	2.0
Southeast	2.2	3.3	1.4	1.4
Delta States	1.8	1.9	1.1	1.3
Southern Plains	5.5	5.3	3.7	3.8
Mountain	3.7	2.8	2.2	1.9
Pacific	1.0	1.5	1.3	1.1
United States2/	33.8	50.8	25.9	21.3
Percent of all cropland:	Percent			
Northeast	12.2	11.1	7.0	5.3
Lake States	9.2	17.0	7.1	4.9
Corn Belt	3.6	14.1	4.3	3.0
Northern Plains	6.1	7.1	4.9	3.5
Appalachian	10.2	14.0	7.4	6.5
Southeast	10.5	15.9	6.8	6.7
Delta States	8.7	7.9	4.4	5.3
Southern Plains	10.2	9.5	6.7	6.9
Mountain	8.6	6.4	5.0	4.3
Pacific	3.7	6.2	4.9	4.4
United States2/	7.3	10.8	5.5	4.5

1/ Estimated for years coinciding with a Census of Agriculture. 2/ Includes the 48 conterminous States

Source: (2,3,4,19).

Table 8.--Cropland used for crops as percent of total cropland by region

Region	1949	1959	1969	1978	1982
	Percent				
Northeast	69.9	72.4	68.4	75.2	80.2
Lake States	82.3	80.6	71.1	84.3	88.4
Corn Belt	81.2	82.9	69.4	81.9	86.1
Northern Plains	93.2	89.3	82.4	85.9	87.6
Appalachian	59.6	58.1	46.7	58.5	63.6
Southeast	72.4	69.1	56.5	68.3	72.0
Delta States	68.3	62.8	64.9	74.1	77.0
Southern Plains	82.8	69.8	60.5	64.1	67.6
Mountain	87.4	80.1	80.4	83.9	85.3
Pacific	77.0	78.3	78.4	83.0	84.5
United States1/	81.0	78.4	70.5	78.3	81.6

1/ Includes the 48 conterminous States. Total cropland is only estimated for years coinciding with a Census of Agriculture.

Source: (11).

Percentages were substantially lower in the Plains regions as farmers shifted cropland to cropland pasture. Percentages increased in all regions during the 1969–82 expansion, particularly in the Lake States, Corn Belt, Appalachian, and Southeast regions.

Acreage of irrigated land in farms rose steadily during 1949–74, increased more significantly in 1974–78 when cost–price relationships were relatively favorable, and declined slightly during 1982 (table 9). Reported acreages represent those actually irrigated in the census year rather than acres that could be irrigated. Cropland can be used more intensively with supplemental irrigation, and some cropland doesn't need to be summer fallowed. Largest increases in irrigated acres occurred during 1969–78, especially in the Northern Plains, Mountain, and Pacific regions. Precipitation in 1982 was near or above normal in most parts of the Nation, except for portions of the Plains regions and isolated parts of coastal regions in the East (16). This probably accounted for the relatively large increase in acres irrigated in

Table 9.—Irrigated land in farms, 1949–821/

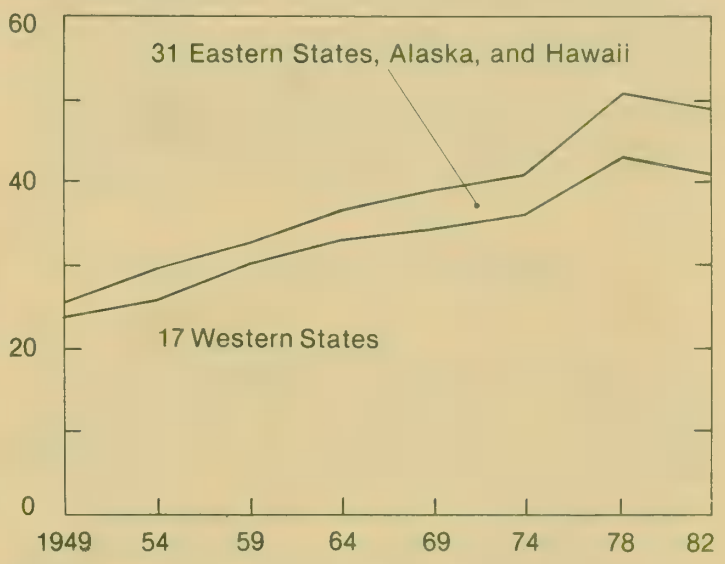
Region	1949	1959	1969	1978	1982
			1,000 acres		
Northeast	87	206	226	247	270
Lake States	28	87	219	732	860
Corn Belt	16	87	204	651	820
Northern Plains	1,128	3,004	4,590	8,845	9,253
Appalachian	6	117	131	160	166
Southeast	374	490	1,470	2,533	2,307
Delta States	1,004	1,297	1,862	2,673	3,148
Southern Plains	3,166	5,854	7,412	7,549	6,068
Mountain	11,642	12,095	12,799	14,774	14,056
Pacific	8,334	9,787	9,983	12,026	11,907
48 States	25,785	33,024	38,976	50,190	48,855
Alaska	-	-	1	1	1
Hawaii	117	141	146	159	146
United States	25,902	33,165	39,123	50,350	49,002

1/ Because of changes in definition and procedures, data are not strictly comparable among census years. Data represent acres actually irrigated in the census year rather than acres which could be irrigated.

Source: (4).

Irrigated Land in Farms

Million acres



Source: U.S. Census of Agriculture.

Table 10.--Indices of crop production per acre of cropland used for crops by region

Year	North-east	Lake States	Corn Belt	Northern Plains	Appa-lachian	South-east	Delta States	Southern Plains	Mountain	Pacific	United States1/
					1977 = 100						
1949	78	52	53	41	79	59	83	68	63	55	60
1954	80	56	53	44	85	63	90	54	64	64	61
1959	87	66	65	54	95	80	112	72	80	72	72
1964	92	69	75	63	121	106	129	78	81	79	81
1969	109	85	93	84	114	113	101	80	92	87	91
1974	106	78	77	77	108	125	100	77	98	97	88
1978	109	102	108	110	109	114	100	83	109	95	105
1979	109	105	116	119	102	120	112	109	107	107	113
1980	104	100	102	92	95	102	81	79	111	113	100
1981	112	107	114	113	119	121	106	105	118	112	114
1982	116	114	119	120	121	127	117	83	118	114	117
1983	105	101	88	104	88	116	96	95	112	114	100
19842/											111

1/ Includes the 48 conterminous States. 2/ Regional estimates were not developed for 1984.

Source: (11).

the Northern Plains in 1982, while acreage was down in other regions where irrigation is important, except the Delta States. The Mountain and Pacific regions had over half of all irrigated acres in 1982; the Plains regions had about one-third.

Indices of crop production per acre are additional indicators of intensity of use. However, several factors affect index values. Technological and managerial improvements, more inputs applied to an acre of land, and changes in cropping patterns, such as double cropping, raise per-acre productivity. After crops have been planted, changes in weather and growing conditions have less impact on intensity of cropland use, but generally have direct impact on production outcomes and per-acre productivity. With 1977=100 as a base, the U.S. index trended upward from 60 in 1949 to 117 in 1982 (table 10). Unfavorable weather throughout much of the country caused the index to decline in 1980 and 1983.

DYNAMICS OF CROPLAND USE

Changes in cost-price relationships, production technologies, farm programs, and demand for land for nonagricultural uses have all affected the profitability of crop and livestock production and, in turn, altered comparative advantages of production among States and regions. Indications of these adjustments have been developed from changes in county-level data for 1949-69 and 1969-82 as reported in Censuses of Agriculture. Because of changes in definitions and procedures, data are not strictly comparable among all census years (7).

Table 11.--Cropland and change in acreage in counties by region, 1949-69

Region	Cropland, excluding cropland pasture1/		Counties with:			Regional net change2/
	1949	1969	Increases	Decreases or change		
	Million		Number	Million acres	Number	Million
Northeast	20.3	13.3	8	0.1	236	7.1	-7.0
Lake States	40.7	37.2	49	0.7	193	4.3	-3.5
Corn Belt	81.0	82.6	282	5.2	214	3.6	+1.6
Northern Plains	96.0	92.0	[illegible]	2.4	219	6.4	-4.0
Appalachian	26.1	17.5	31	0.2	437	8.8	-8.6
Southeast	23.6	14.2	[illegible]	0.9	300	10.3	-9.4
Delta States	18.4	17.3	64	3.1	157	4.2	-1.1
Southern Plains	45.0	38.6	73	2.3	258	8.7	-6.4
Mountain	35.5	36.7	109	3.8	170	2.6	+1.3
Pacific	21.8	20.9	31	1.4	102	2.3	-0.9
[illegible] States2/,3/	408.5	370.5	785	20.2	2,286	58.3	-38.0

1/ Includes cropland that was either harvested, idle, planted to soil improvement crops that [illegible] not harvested or pastured, summer fallow, or land on which all crops failed. Excludes cropland used only for pasture or grazing. 2/ Acreages may not [illegible] to totals due to rounding. 3/ Excludes Alaska and Hawaii.

Source: (7).

Changes in definition of a farm and changes in value of sales, as a criterion for qualifying as a farm, could account for some shifts in land use even if actual land use didn't change. Land-use changes cannot be tracked precisely with secondary data, but net changes can be examined.

Changes During 1949-69

Cropland acreage (excluding cropland pasture) peaked at nearly 409 million in 1949 (table 11). Due to expected inconsistencies in classifying some pasture as cropland pasture (and part of the cropland base) or as permanent pasture, cropland pasture is excluded from estimates of cropland, as used in this section of the report. Cropland acreage declined from 409 million in 1949 to 370 million in 1969. This decline was only partially offset by an increase of nearly 10 million acres during 1969-82.

Decreases or no change in cropland acreage occurred in three-fourths of all counties during 1949-69. This adjustment was most evident in the Northeast, Appalachian, Southeast (particularly the Piedmont), and throughout the Plains regions (fig. 7).

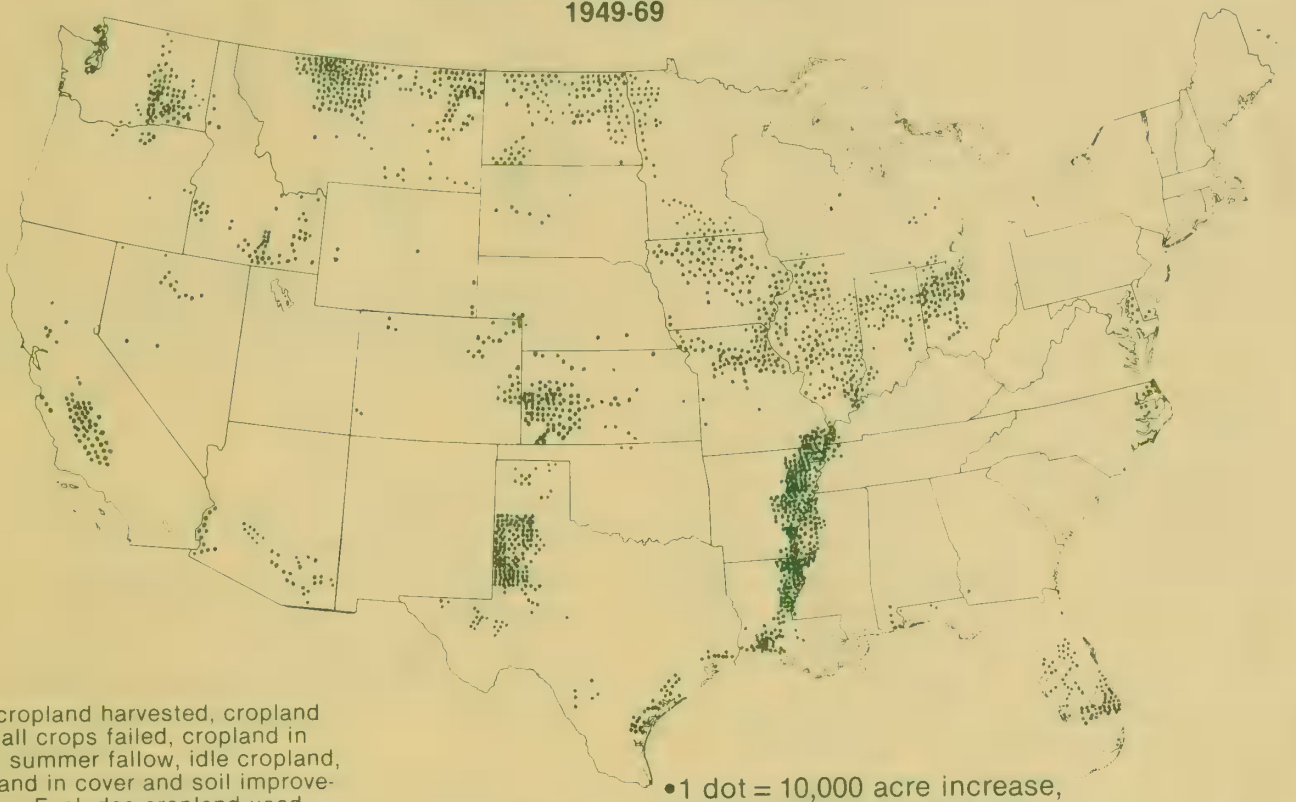
Sizable acreages in the Northeast and Appalachian regions were converted to urban and other nonagricultural uses and to forest land (3,18). Some of the additional forest land likely resulted from native vegetation taking over abandoned cropland. Cropland was also shifted to cropland pasture in the Appalachian region. The largest decline occurred in the Southeast, where probably half the former cropland diverted under Federal farm programs and seeded to soil-improvement crops was never returned to crop production but was converted to permanent pasture and cropland pasture. Additional cropland in the Southeast was converted to urban and other agricultural uses and to forest land (3, 18). Each of the three regions had counties where cropland acreage increased, but the advances were relatively small compared with the declines.

The Plains regions had 20 percent of the counties where cropland acreage declined or was unchanged and 25 percent of the acreage. Most of the reduction in the Northern Plains probably resulted from an increase in cropland pasture, while cropland pasture and permanent

Figure 7

Cropland Acreage Changes, 1949-69

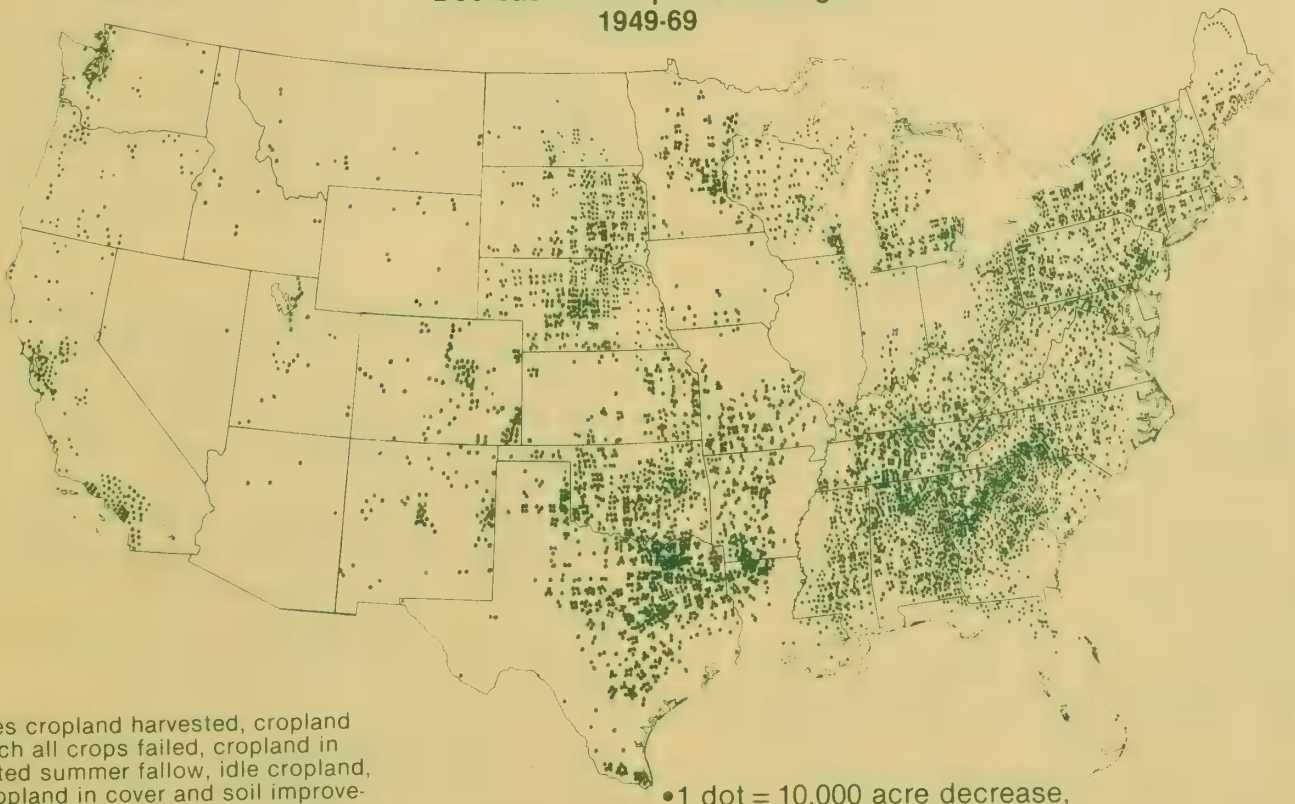
Increase in Cropland Acreage* 1949-69



*Includes cropland harvested, cropland on which all crops failed, cropland in cultivated summer fallow, idle cropland, and cropland in cover and soil improvement crops. Excludes cropland used only for pasture.
Source: U.S. Census of Agriculture

•1 dot = 10,000 acre increase, in counties which had a net increase in cropland acreage.

Decrease in Cropland Acreage* 1949-69



*Includes cropland harvested, cropland on which all crops failed, cropland in cultivated summer fallow, idle cropland, and cropland in cover and soil improvement crops. Excludes cropland used only for pasture.
Source: U.S. Census of Agriculture

•1 dot = 10,000 acre decrease, in counties which had a net decrease in cropland acreage.

pasture both increased substantially in the Southern Plains (3,18). As with the Southeast, much of the cropland diverted was never returned to crop production. Nonirrigated production was increasingly unprofitable compared to more humid areas, and cropland was converted to grass (7). Several counties accounted for a 4.7-million-acre increase in cropland that only partially offset declines in other counties. Permanent pasture was converted to cropland in the Northern Plains, while large acreages of forest land were cleared in the Southern Plains for cropland and for pasture.

Largest increases in cropland acreage occurred in the Corn Belt, Delta States, and Mountain regions. However, only the Corn Belt and Mountain regions had net increases, partly due to improved drainage and cleared forest land (3,5,18). Permanent pasture was also converted to crop production in the Corn Belt. Increases were spread throughout the Corn Belt, but largely confined to the Mississippi Delta in the Delta States region (fig. 7). Major conversions of permanent pasture and rangeland to other uses, including cropland, plus increased irrigation--particularly in Montana and Idaho--contributed to the 3.8-million-acre increase in cropland in the Mountain region and to its 1.3-million-acre net gain.

Changes During 1969-82

All regions, except the Plains, had net increases in cropland during 1969-82 (table 12). Largest net increases were in the Corn Belt, Lake States, and Delta States regions---7.7 million acres and nearly 80 percent of the total net increase--but largest percentage increases were in the Appalachian and Delta States regions. Increases were rather evenly distributed throughout the Corn Belt and Lake States, but were concentrated in the Mississippi Delta of the Delta States and in western and coastal areas of the Appalachian region (fig. 8). Conversions of cropland pasture and forest land were the principal sources of additional cropland in all four regions (3, 4). Reductions in permanent pasture were also significant in the Appalachian region and, to a lesser extent, in the Lake States and Delta States. Improved drainage continued to contribute to additions

Table 12.--Cropland and change in acreage [illegible] counties by region, 1969-82

Region	Cropland, excluding cropland pasture1/ 1969	1982	Counties with: Increases		Decreases or no change		Regional net change2/
	Million [illegible]		Number	Million acres	Number	Million [illegible]	
Northeast	13.3	13.8	161	0.8	82	0.3	+0.5
Lake States	37.2	39.4	194	2.5	48	0.3	+2.2
Corn Belt	82.6	85.9	379	4.1	116	0.8	+3.3
Northern Plains	92.0	90.5	121	2.0	196	3.5	-1.5
Appalachian	17.5	19.3	276	2.4	192	0.6	+1.8
Southeast	14.2	14.6	168	1.3	171	0.9	+0.4
Delta States	17.3	19.5	161	2.5	60	0.4	+2.2
Southern Plains	38.6	37.0	149	1.9	182	3.5	-1.6
Mountain	36.7	38.2	147	2.9	132	1.5	+1.5
Pacific	20.9	21.9	71	1.6	59	0.6	+1.0
48 States2/,3/	370.5	380.1	1,830	21.9	1,238	12.3	+9.8

1/ Includes cropland that was either harvested, idle, planted to soil improvement crops that were not harvested or pastured, [illegible] fallow, or land [illegible] which all crops failed. Excludes cropland used only for pasture or grazing. Because of [illegible] with disclosure, all cropland data [illegible] not reported for [illegible] counties. Missing data were estimated based on relationships in the 1978 census. 2/ Acreages may not add to totals due to rounding. 3/ Excludes Alaska and Hawaii.

Source: (17).

to the cropland base, particularly in the Corn Belt, Delta States, and Lake States regions. The four regions also had a combined reduction of 2.1 million acres of cropland, 17 percent of the overall 12.3-million-acre decrease. Most of this acreage was converted to urban and other nonagricultural uses.

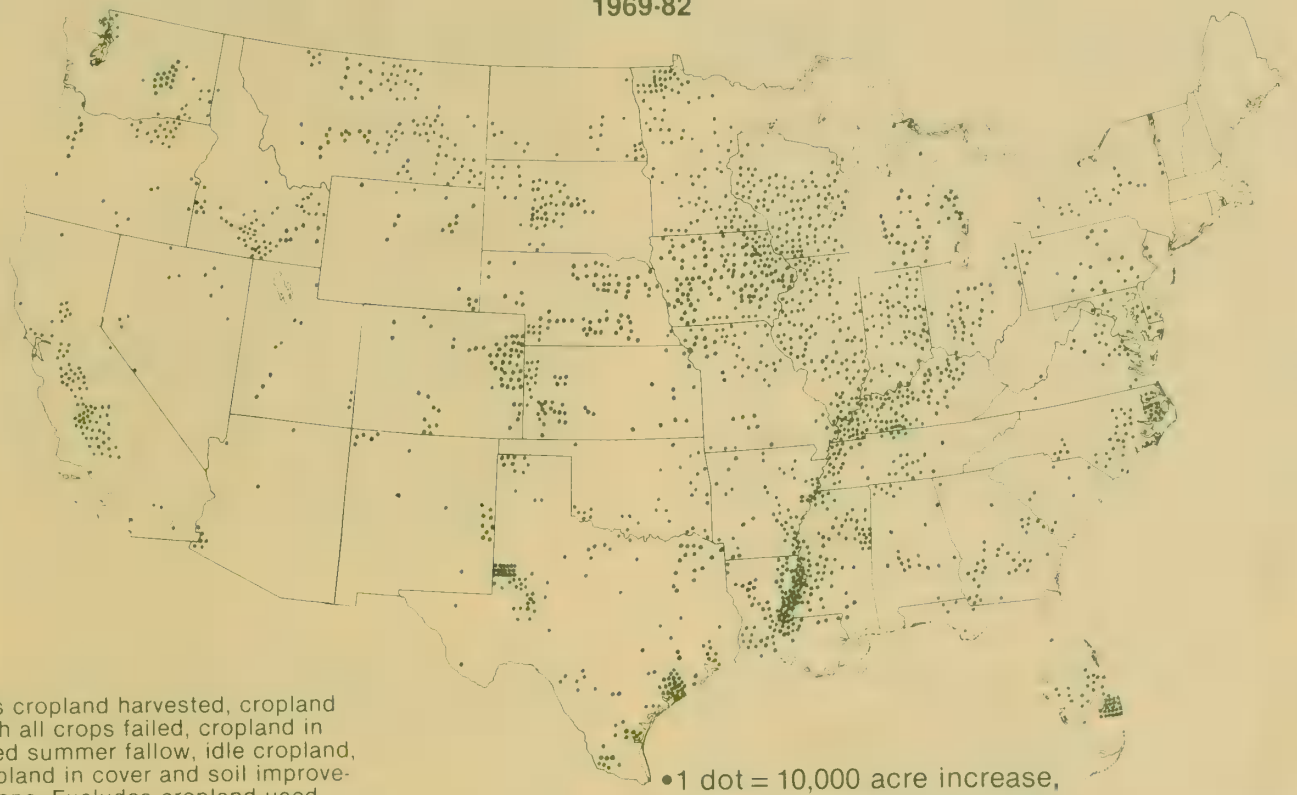
About half the counties in the Mountain region had a combined increase in cropland of 2.9 million acres. The conversion of permanent pasture and rangeland so significant during 1949-69 continued into 1969-82. Irrigated acreage increased about 1.3 million acres. Conversions of cropland pasture to crop production also occurred. The region also had a 1.5-million-acre decrease in cropland as acreage was converted to urban uses, rural parks, and other nonagricultural uses.

The Plains regions each had increases of about 2 million acres resulting from conversions of cropland pasture in both regions and probably some conversion of permanent pasture and rangeland in the Northern Plains and forest land in the Southern Plains (3,4). Irrigated acreage doubled in the Northern Plains but declined in the Southern Plains. Cropland increases in certain counties were more than offset by declines in others. The Plains regions accounted for nearly 60 percent--7 million acres--of the 12.3-million-acre decrease among all U.S. counties reporting a decrease or no change. Acreage in urban and other nonagricultural uses increased in both regions. Also, some cropland probably was converted to permanent pasture in the Southern Plains.

Figure 8

Cropland Acreage Changes, 1969-82

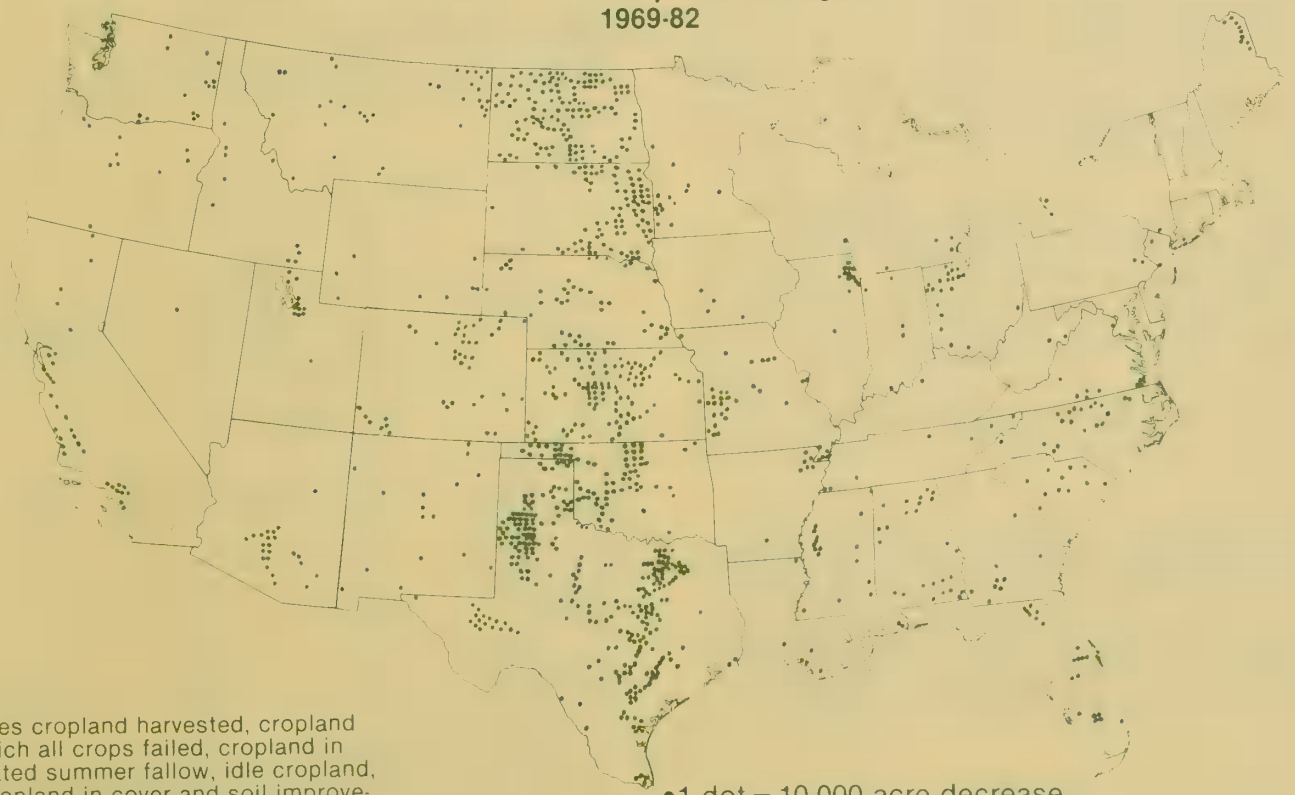
Increase in Cropland Acreage* 1969-82



*Includes cropland harvested, cropland on which all crops failed, cropland in cultivated summer fallow, idle cropland, and cropland in cover and soil improvement crops. Excludes cropland used only for pasture.
Source: U.S. Census of Agriculture

•1 dot = 10,000 acre increase, in counties which had a net increase in cropland acreage.

Decrease in Cropland Acreage* 1969-82



*Includes cropland harvested, cropland on which all crops failed, cropland in cultivated summer fallow, idle cropland, and cropland in cover and soil improvement crops. Excludes cropland used only for pasture.
Source: U.S. Census of Agriculture

•1 dot = 10,000 acre decrease, in counties which had a net decrease in cropland acreage.

Conversions of Land to Urban Uses

Some acreage, including cropland, is converted to nonagricultural uses each year, but the amount is not documented well. However, estimates of conversions to urban uses have been developed from the decennial censuses of population and other sources (20). Previous uses of land added to urban areas cannot be determined from the census data.

Urban areas include the central cities and adjacent urbanized fringe zones, plus all places of 2,500 or more inhabitants outside urbanized areas (1). Since 1960, city boundaries have been extended to include essentially rural areas. Thus, the area in urban uses--often considered irreversible--is probably overstated. But, the census count excludes land-use conversions in places of fewer than 2,500 people outside urbanized areas and in strictly rural areas.

Acreage in urban areas increased from 25.2 million in 1960 to 34.3 and 46.9 million in 1970 and 1980, respectively (table 13). Annual conversions during 1960–70 averaged about .9 million acres, increasing to 1.25 million during 1970–80. The Corn Belt, Southeast, and Pacific regions had the largest shares of the 1960–70 increase, ranging from nearly 14 percent in the Pacific to 17 percent in the Corn Belt. Increases were also relatively high in the Northeast, Appalachian, and Southern Plains regions. Shares changed during 1970–80, as the Northeast's share of the increase rose to 16 percent and the Corn Belt and Pacific regions' shares both dropped to 9–10 percent. Nearly 19 percent of the 1970–80 increase occurred in the Southeast. Smallest increases during both periods were in the Northern Plains and Delta States.

Possible Retirement of Highly Erodible Cropland

Most proposals for the 1985 farm bill include provisions to deny program benefits to farmers who cultivate highly erodible lands but don't use appropriate soil conservation practices (9). Some proposals allow farmers to enter into 7- to 15-year contracts to place erosion-prone cropland in a conservation reserve.

According to SCS, nearly 50 million, or 12 percent, of the 421 million acres of cropland inventoried in 1982 were on highly erodible soils (table 14). Largest concentrations of highly erodible cropland were found in the Plains regions and the Corn Belt, each of which had about 25 percent of the U.S. total. In addition, the Appalachian and Mountain regions each had 12–14 percent of all acreage. Smallest concentrations were located in the Delta States, Southeast, and Pacific regions.

Although the Northeast had only 9 percent of all highly erodible cropland, this acreage represented 25 percent of the region's cropland base, the same percentage as in the Appalachian region. Highly erodible cropland comprised 14–16 percent of all cropland in the Corn Belt, Southern Plains, and Mountain regions. About 6 percent of the cropland in all other regions was identified as highly erodible.

Table 13.--Land in urban [illegible] by region

Region	1960	1970	1980	Change 1960-70	Change 1970-80	Share of change 1960-70	Share of change 1970-80
	1,000 acres					Percent	
Northeast	6,573	7,445	9,438	872	1,993	9.6	15.9
Lake States	2,340	2,957	3,741	617	784	6.8	6.3
Corn Belt	3,861	5,416	6,521	1,555	1,105	17.0	[illegible]
Northern Plains	463	697	938	234	241	2.6	1.9
Appalachian	1,851	2,850	4,395	999	1,545	10.9	12.3
Southeast	2,463	3,953	6,311	1,490	2,358	16.3	18.9
Delta States	918	1,273	1,981	355	708	3.9	5.7
Southern Plains	2,593	3,684	5,153	1,091	1,469	11.9	11.7
Mountain	1,133	1,800	2,871	667	1,071	7.3	8.6
Pacific	3,013	4,268	5,503	1,255	1,235	13.7	9.9
United States1/	25,208	34,343	46,852	9,135	12,509	100.0	100.0

1/ Includes the 48 conterminous States.

Source: (1).

Table 14.--Acres of highly erodible cropland by region, 1982

Region	Acreage	Share of U.S. total	Acreage as percent of all cropland
	1,000 acres	Percent	
Northeast	4,358	8.8	25.2
Lake States	2,741	5.6	6.2
Corn Belt	13,180	26.7	14.3
Northern Plains	5,927	12.0	6.3
Appalachian	5,845	11.8	25.7
Southeast	1,219	2.5	6.7
Delta States	1,492	3.0	6.8
Southern Plains	6,540	13.2	14.6
Mountain	6,746	13.7	15.6
Pacific	1,322	2.7	5.8
United States1/	49,370	100.0	11.7

1/ Includes the 48 conterminous States.

Source: (13).

Potential for Expanding the Cropland Base

With production exceeding domestic and export demand and with crop reserves growing, interest in expanding the cropland base through land-use conversions is not very high. However, cropland availability is always a longer-run concern.

The SCS collected information on the physical and economic potential for converting land to cropland (13). The physical potential was identified according to SCS land capability classes based on site evaluations by SCS field personnel. Classes I through VIII indicate the degree of physical limitation to cultivation.5/ Land in classes I-III is suitable for continuous cultivation. Land in class IV can be cultivated occasionally. Land in classes V-VIII is, under present production practices, generally unsuitable for crops requiring cultivation.

About 802 million acres were in class I-IV and, therefore, considered physically suitable for continuous or occasional cultivation (Table 15). One half, 402 million acres, was already classed as cropland. Over half of the nearly 400 million acres of class I-IV land not in cropland was in grassland, another 40 percent was in forest land, and the remaining 4 percent was in other uses. Only 19 million of the 610 million acres in classes V-VIII were identified as cropland. Most of this cropland is portions of fields with predominately class I-IV soils. Part of the rest of class V-VIII lands would presumably be cropped given strong economic incentives.

5/ Although not shown, classes II-IV and VI-VIII have four subclasses indicating the dominant physical hazard to cultivation.

Table 15.--Cropland and potential for converting noncropland to crop use by land capability class, United States, 1982

Land Capability class	Cropland	Noncropland					Total
		Potential for crop use				Total	
		High	Medium	Low	Zero		
		Million acres					
I	30	1	1	2	1	6	36
II	191	17	32	41	10	100	291
III	134	11	44	80	19	154	288
I-III	355	30	77	123	30	260	615
IV	47	3	26	83	28	140	187
I-IV	402	33	103	206	58	400	802
V-VIII	19	2	15	134	1/440	591	610
Total	421	35	118	340	498	991	2/1,412

1/ Includes 5 million acres not classified by capability.
2/ Nonfederal rural land representing all land in the 48 conterminous States and Hawaii minus urban and built-up areas and federally owned land in these States.

Source: (13).

County committees comprised of USDA representatives evaluated the economic potential for converting land to cropland within the next 10-15 years. Committees considered cost-price relationships in 1981 and information collected by SCS field personnel on soil characteristics, climatic factors, size and distribution of parcels of land, and effort required for conversion. A rating of high potential also required evidence that similar land had been converted to cropland during 1979-81. These evaluations, however, are time-specific. As cost-price relationships vary, determinations of potential for conversion to cropland should also vary.

Of the 400 million acres of noncropland in classes I-IV, 33 million acres--8 percent--had high potential, and 103 million acres--26 percent--had medium potential for conversion to cropland. The remaining 264 million acres--two-thirds of all nonfederal rural land in classes I-IV not classed as cropland--had low or no potential for use as cropland. Federally owned land totaling about 760 million acres was excluded from the NRI. Only a small part of this acreage has potential for crop use.

About one-third of the acreage with high and medium potential--48.2 million acres--was located in the Plains regions (table 16). Nearly all was in pasture and rangeland in 1982. The Mountain region had 15.8 million acres with high and medium potential; 97 percent was in grassland. Conversion costs in both regions should be relatively low.

The Corn Belt had 5.6 million acres with high potential--16 percent of the national total--and 12.3 million acres with medium potential--10 percent of the national total. Over 70 percent of this potential cropland was in grassland in 1982; nearly one-fourth was forest land.

Forest land would be an important source of potential cropland in the Appalachian, Southeast, and Delta States regions. As a

group, these regions had 30 percent--45.1 million acres--of all high and medium potential cropland. About half was forest land in 1982. Half of the potential land in the Northeast and Lake States was also forest land. The Northeast had 7.9 million acres and the Lake States had 10.7 million acres of high and medium potential cropland in 1982.

Several economic, personal, and physical factors can impede conversions to cropland. Cost-price relationships in 1981 and in several preceding years were more favorable than those in 1982 and subsequent years. Length of planning horizons and cash flow/reserve positions affect decisions to change land use.

About 75 percent of the acreage with high potential and 55 percent of the acreage with medium potential had no identifiable physical factors that would limit conversion to cropland. Excessive soil erosion was identified as a limiting factor on 7 and 20 percent of the high and medium potential land, respectively. Availability of irrigation water or problems with drainage or flooding were limitations on only 10 percent of the high and 15 percent of the medium potential land.

Another set of possible limitations includes tract size and location, land held for urban or related development, and longer-term commitments to continue land uses inventoried in 1982. None of these factors was limiting on 70 percent of the high and 55 percent of the medium potential land. Land uses involving a longer-term commitment were identified as limiting on 28

Table 16.--Acreage with high and medium potential for conversion to cropland by region, 1982

Region	High potential				Medium potential			
	Pasture and rangeland	Forest land	Other land	Total	Pasture and rangeland	Forest land	Other land	Total
	1,000 acres							
Northeast	922	545	99	1,566	2,773	3,352	208	6,333
Lake States	1,667	841	144	2,652	2,817	4,791	456	8,064
Corn Belt	4,477	938	186	5,601	8,398	3,324	554	12,276
Northern Plains	4,550	54	146	4,750	15,847	216	375	16,438
Appalachian	2,631	2,005	96	4,732	5,137	8,325	323	13,785
Southeast	1,987	1,576	88	3,651	5,541	6,817	207	12,565
Delta States	1,518	1,042	41	2,601	3,637	4,046	75	7,758
Southern Plains	5,340	78	41	5,459	20,587	814	156	21,557
Mountain	2,767	28	87	2,882	12,559	213	156	12,928
Pacific	1,165	144	25	1,334	3,715	1,837	110	5,662
Hawaii	29	12	2	43	58	24	0	82
United States1/	27,053	7,263	955	35,271	81,069	33,759	2,620	117,448
Percent of U.S. total:	Percent							
Northeast	3.4	7.5	10.3	4.4	3.4	9.9	7.9	5.4
Lake States	6.2	11.6	15.1	7.5	3.5	14.2	17.4	6.9
Corn Belt	16.6	12.9	19.5	15.9	10.4	9.8	21.2	10.5
Northern Plains	16.8	0.7	15.3	13.5	19.5	0.6	14.3	14.0
Appalachian	9.7	27.6	10.0	13.4	6.3	24.7	12.3	11.7
Southeast	7.3	21.7	9.2	10.4	6.8	20.2	7.9	10.7
Delta States	5.6	14.3	4.3	7.4	4.5	12.0	2.9	6.6
Southern Plains	19.7	1.1	4.3	15.5	25.4	2.4	6.0	18.4
Mountain	10.2	0.4	9.1	8.2	15.5	0.6	5.9	11.0
Pacific	4.3	2.0	2.6	3.8	4.6	5.4	4.2	4.8
Hawaii	0.1	0.2	0.3	0.1	0.1	0.1	0.0	0.1
United States1/	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Includes the 48 conterminous States and Hawaii. Due to rounding, numbers may not sum to totals.

Source: (13)

Table 17.—Acreage and percentage share of cropland plus land with high and medium potential for conversion by region, 1982

Region	Cropland	Share of U.S. total	Cropland plus land with high and medium potential	Share of U.S. total
	Million acres	Percent	Million acres	Percent
Northeast	17.3	4.1	25.2	4.4
Lake States	43.9	10.4	54.6	9.5
Corn Belt	92.4	21.9	110.3	19.2
Northern Plains	93.4	22.2	114.6	20.0
Appalachian	22.7	5.4	41.2	7.2
Southeast	18.2	4.3	34.4	6.0
Delta States	21.9	5.2	32.3	5.6
Southern Plains	44.9	10.7	71.9	12.5
Mountain	43.3	10.3	59.1	10.3
Pacific	22.7	5.4	29.7	5.2
Hawaii	0.3	0.1	0.4	0.1
United States1/	421.0	100.0	573.7	100.0

1/ Includes the 48 conterminous States and Hawaii.

Source: (13).

percent of the high and 37 percent of the medium potential land. This factor seemed particularly important in the Delta States, Southeast, and Pacific regions--all with sizable acreages of forest land--and in the Northern Plains and Mountain regions, presumably because of large acreages of rangeland. Less than 1 percent of all land with high and medium potential was designated as being held for urban or related development. Small or isolated tracts were limiting factors on only 6 percent of the high and medium potential land; the incidence was highest in the Northeast, Mountain, and Pacific regions.

Regional shares of cropland would change somewhat if land with high and medium potential for conversion to cropland was added to cropland inventoried in 1982 (table 17).6/ Regions with reductions in percentage shares include the Corn Belt and Northern Plains with -2.7 and -2.2 percent, respectively. Gainers include the Appalachian, Southeast, and Southern Plains with about a 1.8-percent increase for each region. Regions east and south of the Corn Belt would account for a 6-percent increase in their share of the U.S. total.

6/ The substantial difference between the 421 million acres of total cropland estimated in the 1982 NRI and the 469 million acres in Table 1 is largely due to differences in procedures for classifying better quality pastureland as cropland pasture or as pastureland.

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LIST OF TABLES

TRENDS IN DOUBLE CROPPING

by

Roger W. Hexem and Robert F. Boxley1/

Abstract: Acreage double cropped in the United States nearly quadrupled during 1969–82, increasing from 3.1 to 12.4 million acres. This acreage represented 3.7 percent of all acres harvested in 1982, compared with only 1.1 percent in 1969. Expansions in double cropping were especially strong in the Appalachian, Delta States, and Southeast regions, where growing seasons are relatively long. But, more acres have been double cropped throughout the United States, because of rising commodity prices during the 1970's, development of earlier maturing plant varieties, shifts to conservation tillage (which allows more timely planting of the second crop), more supplemental irrigation, and formulation of herbicides suitable for conservation tillage.

Keywords: Double cropping, conservation tillage, cropping systems, management, soybeans.

Double cropping occurs when two crops are grown for harvest on the same field within a year.2/ Variations of this cropping pattern have been practiced for centuries, but adoption in the United States began primarily after the mid-1940's, and the practice has become more popular in recent years (2,9).3/ Favorable growing conditions have long permitted double cropping in southern and coastal States. Development of earlier maturing plant varieties, more supplemental irrigation, shifts from conventional to conservation tillage, and better farm management have encouraged adoption of double cropping, particularly in other areas of the country. Multiple cropping--which usually includes vegetables--is possible under the most favorable growing conditions. The term "double cropping" will be used to represent both double and multiple cropping.

Few indicators of the extent of double cropping exist. The Statistical Reporting Service (SRS) develops unofficial estimates of the percentage of soybean acreage double cropped (10). Double cropping is not explicitly reported in the Census of Agriculture (11). Rather, acres double cropped are derived as the difference between total acres harvested and acres of harvested cropland; in the latter figure, an acre double cropped is counted as only 1 acre of harvested cropland.4/

Physical conditions determine the technical feasibility for double cropping. As

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1/ Agricultural economists, Natural Resource Economics Division, Economic Research Service. This article summarizes a longer forthcoming ERS publication of the same title. It will contain a more complete discussion and quantitative estimation of selected factors affecting the incidence of double cropping. It also discusses results of the various studies on the profitability of double cropping.

2/ The production year is 12 months, except in arid areas, where only one crop can be grown every 2 years because of insufficient soil moisture. In these areas, double cropping involves growing two or more crops every 2 years.

3/ Numbers in parentheses cite references at the end of this article.

4/ An acre of hay planted once but harvested for different purposes within a year counts as being double cropped in Censuses of Agriculture. This tends to make the estimate of acreage double cropped too high.

length of growing season and availability of soil moisture become more limiting, opportunities for double cropping are reduced. Acreage double cropped in any year depends on producers' expectations of growing conditions and costs and returns for single-crop compared with double-crop production.

Fall-seeded grains followed by soybeans make the most prevalent combination of double cropping from southern and coastal regions into southern portions of the Corn Belt. Farther north, the grain and/or row crops may be harvested as silage. Legumes can be interseeded with small grains to provide some forage after harvesting the grain. Established legume and other grasses can be cut for hay and later in the same year harvested for hay, green chop, or seed.

Acreage double cropped in the United States nearly quadrupled during 1969-82, increasing from about 3.1 to 12.4 million acres (table 1). These increases are associated with several factors:

- Expanding export markets in the 1970's and sharply higher prices made wheat and soybeans more profitable, individually and as a double crop, than in preceding years.
- Development of earlier maturing, high-yielding winter wheat and barley permitted a longer growing season for a second crop such as soybeans, corn, or sorghum.
- New technology and equipment accelerated adoption of conservation tillage, particularly no-till, allowing more timely planting of the second crop.
- New herbicides provided good weed control with conservation tillage.

During the period, acreage double cropped increased in all regions, with largest expansions occurring in the Appalachian, Southeast, and Delta States. These regions accounted for nearly 45 percent of all acreage in 1982. The largest increase was in the Delta States, where acreage grew from 275,000 to 2.1 million acres. Double cropping was also important in the Corn Belt, which had 2.1 million acres in 1982, about 17 percent of the U.S. total. The practice was least prevalent in the Northeast, Mountain, and Pacific regions, where weather and length of growing season limit cropping possibilities.

Table 1.--Acres double cropped and percentage of U.S. total, by region 1/

Region	1969	1974	1978	1982
	1,000 acres			
ACREAGE DOUBLE CROPPED				
Northeast	158	409	575	694
Lake States	275	678	1,093	1,078
Corn Belt	816	1,511	1,611	2,130
Northern Plains	422	721	1,387	1,536
Appalachian	308	830	712	1,811
Southeast	308	407	567	1,529
Delta States	275	367	404	2,113
Southern Plains	240	343	492	603
Mountain	115	189	390	360
Pacific	190	306	508	499
United States 2/	3,107	5,761	7,739	12,353
SHARE OF U.S. TOTAL				
	Percent			
Northeast	5.1	7.1	7.4	5.6
Lake States	8.8	11.8	14.1	8.7
Corn Belt	26.3	26.2	20.8	17.3
Northern Plains	13.6	12.5	17.9	12.4
Appalachian	9.9	14.4	9.2	14.7
Southeast	9.9	7.1	7.3	12.4
Delta States	8.9	6.4	5.2	17.1
Southern Plains	7.7	5.9	6.4	4.9
Mountain	3.7	3.3	5.1	2.9
Pacific	6.1	5.3	6.6	4.0
United States 2/	100.0	100.0	100.0	100.0

1/ Because of changes in definition and procedures, data are not strictly comparable among census years. Results from the area frame sample used only in 1978 are excluded to increase comparability with earlier censuses. Acres double cropped are derived as the difference between total acres harvested and acres of harvested cropland when an acre double cropped is only counted as 1 acre of harvested cropland.
2/ Excludes Alaska and Hawaii.

Source: (11).

Regional shares shifted from northern to southern regions during 1974-82. The Northeast, Lake States, and Corn Belt had a combined share of 45 percent in 1974, but only 32 percent in 1984. Percentage shares increased dramatically in the Southeast and Delta States, from a combined 13.5 to 29.5 percent.

Farmers are double cropping more acres, but the total acreage is still relatively small. In 1982, only 3.7 percent of all acres harvested in the United States were double cropped, compared with 2.4 and 1.9 percent in 1978 and 1974, respectively (table 2). In 1982, the highest incidence occurred in the Appalachian, Delta States, and Southeast regions where 9 to 10 percent of harvested acres in each region was double cropped. Except for the Northeast, acreage in other regions was less than 3 percent of all acres harvested.

Favorable prices for small grains and soybeans during the 1970's encouraged growers to double crop more soybeans. The percentage double cropped increased from about 5 percent in 1978 to a high of nearly 16 percent in 1982, but then steadily declined to 8 percent in 1985 (table 3). (SRS first published these unofficial estimates in 1978.) The 1982-83 reductions in most regions were likely associated with lower soybean prices beginning in mid-1982 and an 11-percent drop in acres of all soybeans planted in the United States (10). Idling wheat and other small grain acreage with the payment-in-kind (PIK) and other cropland diversion programs in 1983 also reduced the plantings of soybeans that would normally have been double cropped with small grains.

Table 2.--Acres double cropped as percentages of total acres harvested by region 1/

Region	1969	1974	1978	1982
	Percent			
Northeast	1.4	3.3	4.3	5.1
Lake States	0.9	2.0	3.0	2.8
Corn Belt	1.2	1.9	2.0	2.5
Northern Plains	0.7	1.0	2.0	2.1
Appalachian	2.3	5.4	4.1	9.4
Southeast	2.8	3.4	4.1	10.4
Delta States	1.8	2.4	2.2	10.5
Southern Plains	0.8	1.2	1.7	2.0
Mountain	0.5	0.8	1.5	1.5
Pacific	1.3	1.8	2.9	2.8
United States 2/	1.1	1.9	2.4	3.7

1/ Because of changes in definition and procedures, data are not strictly comparable among census years. Results from the area frame sample used only in 1978 are excluded to increase comparability with earlier censuses.
2/ Excludes Alaska and Hawaii.

Source: (11).

Despite higher soybean prices beginning in mid-1983 and an 8-percent increase in total soybean acres planted during 1983-84, acreage double cropped fell to 7.4 million in 1984--about 11 percent of all soybeans planted. The 1983-84 decline in double cropped soybeans partly resulted from unfavorable weather in portions of the South; the bad weather delayed harvesting of small grains and planting of soybeans. Also, more sorghum is grown as the second crop.

A combination of factors during the 1984-85 season--lower prices for wheat and soybeans (although the support price for wheat was up slightly), an increase in acreage of cropland diverted, and unfavorable weather that delayed planting of both fall-seeded grains and soybeans in portions of several regions--caused U.S. growers to reduce acreages of fall-seeded grains in 1984 by 9 percent and soybeans in 1985 by 7 percent below a year earlier. Soybean acreage double cropped in 1985 was only 5.1 million acres.

Percentages of soybeans double cropped have been relatively high in the Northeast, but area of all soybeans there has been only about 1 million acres in recent years, less than 2 percent of the U.S. total (table 3). Double-cropped percentages have also been high in the Appalachian and Southeast regions which jointly accounted for only 15 percent all soybean acreage in 1985 but contained nearly 60 percent of all the soybeans double cropped.

Soybean production in the United States is concentrated in the Corn Belt. This region had nearly half the U.S. soybean acreage in 1985 but only 17 percent of the acreage double cropped. The proportion of soybean acres doubled cropped ranged from 6 percent in 1981 to less than 3 percent in 1985.

Soybeans double cropped in the Delta States steadily declined from a high of 3 million acres in 1982 to only 700,000 in 1985. Acreage of fall-seeded grains dropped by two-thirds during this period, and acreage of all soybeans was off 20 percent. Unfavorable weather in 1984 and 1985 was especially harmful.

Acreage of soybeans double cropped in the Plains regions has not varied much in recent years. No double cropping of soybeans was reported for the Lake States, where

Table 3.--Percentages and acres of soybeans double cropped by region, 1978-85 1/

Region	1978	1979	1980	1981	1982	1983	1984	1985
				Percent				
Northeast	22.5	21.2	26.2	36.8	38.5	33.3	28.8	36.0
Lake States								
Corn Belt	3.0	3.0	3.7	6.0	4.9	5.1	4.8	2.8
Northern Plains2/	3.6	3.8	8.5	7.8	4.1	3.4	5.1	3.9
Appalachian	8.3	11.4	23.7	36.2	34.9	33.0	31.7	27.4
Southeast	17.9	16.9	22.8	37.2	47.6	31.7	29.8	34.5
Delta States	4.2	6.0	9.3	18.4	26.6	21.3	18.1	7.6
Southern Plains	9.8	11.6	12.7	24.3	25.8	11.5	15.7	8.9
Mountain								
Pacific								
United States3/	5.2	5.8	8.9	14.3	15.7	12.3	10.9	8.1
				Million acres				
Northeast	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.3
Lake States								
Corn Belt	0.9	1.0	1.2	1.8	1.6	1.5	1.5	0.9
Northern Plains2/	0.1	0.2	0.4	0.4	0.2	0.3	0.3	0.2
Appalachian	0.5	0.8	1.6	2.4	2.4	1.9	1.9	1.4
Southeast	1.0	1.1	1.5	2.4	3.2	1.7	1.6	1.6
Delta States	0.5	0.8	1.1	2.1	3.0	2.1	1.7	0.7
Southern Plains	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.1
Mountain								
Pacific								
United States3/4/	3.4	4.1	6.2	9.7	11.1	7.7	7.4	5.1

1/ Percentages are designated as unofficial estimates by USDA's Statistical Reporting Service. 2/ Estimates reported for Kansas only. 3/ Excludes Alaska and Hawaii. 4/ Due to rounding, numbers may not sum to totals.

Source: (10).

length of growing season is limiting. Soybeans are not grown in the Mountain and Pacific regions, or least not at sufficient levels for reporting.

Impacts of Double Cropping

More intensive use of land with double cropping may generate economic benefits, but longer term consequences are also important. Shifts from single to double cropping increase the productive capacity of the agricultural sector. Double cropping of wheat and soybeans, for example, has resulted in productivity increases of 30 percent in southern portions of the Northeast and Corn Belt regions (5). However, soil, nutrient, and water management is necessary so that long-term productivity of resources is not impaired. Increased productive capacity resulting from double cropping is another factor to be considered in development of Federal programs to control acreage and production.

Double cropping provides more production options to the decisionmaker. Small grains as a typical first crop can be harvested for grain, silage, or hay; can be grazed; or can simply be used as a cover crop. The second and, in some cases, third crop could be soybeans, sorghum, corn grown for grain or forage, or vegetables. Producers who double crop can be more responsive to changes in market conditions. Producers also have greater capability to alter crop patterns to changes in growing conditions throughout the production year.

More exposure of soils to wind and water erosion may result from double cropping. Fields are most susceptible to erosion from the time of field preparation to about 60 days after planting. With double cropping, two

periods of potentially high erosion exist each year, raising chances of soil runoff (4). Depending on the crop grown, soils, and climatic conditions, the wind erosion hazard may increase or decrease. On the other hand, double cropping usually provides more ground cover and thus should reduce the erosion hazard (1,7). Also, erosion can be reduced with conservation tillage, particularly on hilly land not suitable for row crops.

As producers adopt conservation tillage, double cropping becomes more feasible. Such tillage requires increased use of herbicides and other agricultural chemicals. Some chemicals adhere to soil particles and others dissolve in soil runoff and water percolation, thereby increasing possibilities for water degradation. But, conservation tillage is also effective in keeping soil in place thereby helping maintain soil productivity.

Increases in double cropping could help alleviate feed grain deficits in some areas, such as the Southeast (13). But, more double cropping, such as wheat followed by a feed grain, may make current Federal programs to reduce wheat and feed grain production less effective.

When double cropping increases and/or stabilizes net returns relative to single cropping, the economic viability of the farm should be improved. Local and regional economic activity may be stimulated.

Factors Affecting Adoption

The decision to double crop can vary from year to year, particularly in areas where growing conditions are limiting. When weather is favorable for early planting and harvesting of the first crop, and soil moisture is adequate for planting a second crop, double cropping may be possible in that particular year. If growing conditions are not favorable, production can be restricted to a single crop.

Length of growing season and the amount and distribution of precipitation are the principal physical factors determining the feasibility of double cropping. The average length of frost-free period varies widely across the United States. If the growing season is relatively long, for example, 250 days or more, two summer crops involving some combination of corn, soybeans, sorghum, and sunflowers may be successful (13,14,16). But, supplemental irrigation and high levels of management are required for sustained success. In the western United States, 200 or more frost-free days plus adequate irrigation water are required for successful double cropping (3). At least 30 inches of precipitation are needed annually for nonirrigated production. Double cropping with soybeans is possible into southern portions of the Corn Belt, where the frost-free period averages 170-180 days. As the growing season becomes shorter in central and northern regions, cropping possibilities are fewer. There, more crops in double cropping systems are grown for forage than for grain.

Levels of soil moisture are particularly critical for quick germination and establishment of the second crop. Delays may result in lower yields, making double cropping less profitable or unprofitable. Supplemental irrigation helps avoid such delays. If the second crop is planted on time and if the first crop has not unduly depleted soil moisture and nutrients, yields should be comparable to those for a single-season crop (6,8,9,14).

Conservation tillage helps conserve soil moisture. However, soil temperatures may be lower because of crop residues resulting from conservation tillage. This may delay seed germination in cooler regions. Insect and plant disease problems may be more severe with conservation tillage. Plant diseases and pests are problems in some southern areas even with conventional tillage (14,16).

Double cropping requires a high level of management. Production and management of the first crop may adversely affect the second crop through excessive depletion of soil nutrients and/or moisture and an increase in the incidence of plant pests and diseases. Producers' decisions on planting and harvesting dates are important. Appropriate choices of early-maturing varieties, crop sequences, row spacing, plant population, herbicides, and cultivation practices are needed to help ensure success.

Nutrient management is also important. If the second crop is no-tilled, nutrients for both crops are usually applied when the first crop is fertilized. Harvesting the entire plant may remove two or three times as many

nutrients as harvesting only the grain (15). If a fall-seeded grain is grazed or harvested as silage, nutrient needs for the second crop will require closer attention.

Producers double cropping anticipate higher net returns than returns expected from single cropping. Additional risks and expenses are involved, but price and production risks are spread over two crops. Such diversification of production could also result in more stability of returns to producers. Creditworthiness of producers may be improved. Returns from the first crop can be used toward expenses for growing and harvesting the second crop, thereby improving cash-flow positions.

Though yields for the second crop may be lower than yields under single-crop conditions, economic returns can be comparable or higher because of savings of time, labor, and machinery costs, especially when no-till is used. Spreading fixed costs of production over two or more crops reduces unit production costs for individual crops. Also, residual nutrients from the first crop can be used by the following crop.

The few studies of the economics of double cropping are based on field experiments conducted at different times and under different cultivation practices, growing conditions, and cost-price relationships. Results are highly variable. Much less is known about profitability under actual field conditions and in combination with other crops and livestock enterprises within farm units.

Prospects for Further Expansion of Double Cropping

Length of growing season and available soil moisture are subject to variation and cycles but no long-term changes are probably anticipated. Since small grains and row crops are currently being double cropped in areas with 170-180 frost-free days, most of the lower half of the eastern United States plus coastal areas up to New York and a small area just below Lake Erie have sufficiently long growing seasons (12). If 200 or more frost-free days are needed in the western United States, double cropping could be practiced in most of Texas and Oklahoma, much of Arizona and New Mexico, and in coastal areas of the Pacific region. Development and adoption of technological improvements are expected to continue, thereby expanding the geographical boundaries for double cropping.

Opportunities exist for increasing the acreage double cropped in several parts of the country. More opportunities will be available in the future. But possibilities for economic returns below those for single cropping also exist. Producers will need to be adept in making appropriate managerial decisions to realize gains and/or avoid losses from double cropping.

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